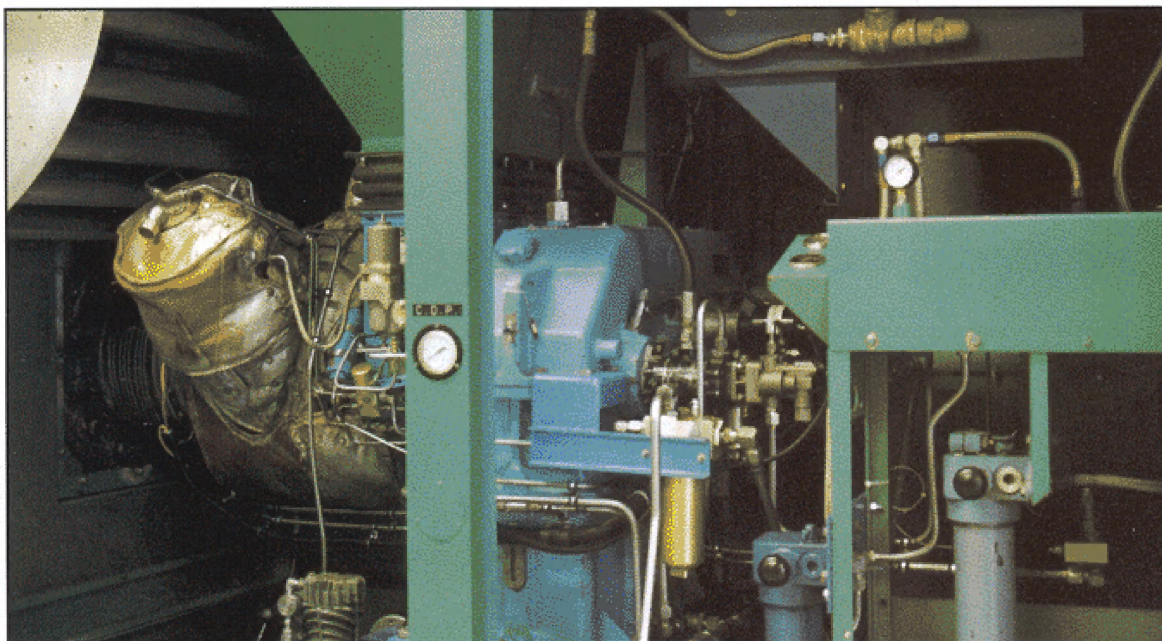




Improving our understanding of your problems

*Turbine-driven generator sets provide
backup power at Bently Nevada's Minden facility*



One of the two Garrett 831 gas turbine-driven generator sets which was recently installed at our Minden, Nevada facility.

Bently Nevada has installed two Garrett 831 turbine-driven generator sets at its Minden, Nevada facility. The turbines were installed to supply backup power and to provide a site where our employees can interact with our machine protection and management systems on real machinery. It is also a great advantage for our design teams to have access to turbomachinery a few feet from their desks.

Another benefit is that Bently Nevada sales and service personnel can demonstrate the use of a telephone modem to access machinery information from the generator sets anywhere in the world.

During commissioning, the units were put online to support our manufacturing facility for a full eight hour shift. However, vibration levels on the generator started to increase. Before the shift ended, the power had to be switched back to the local utility, interrupting a critical manufacturing process.

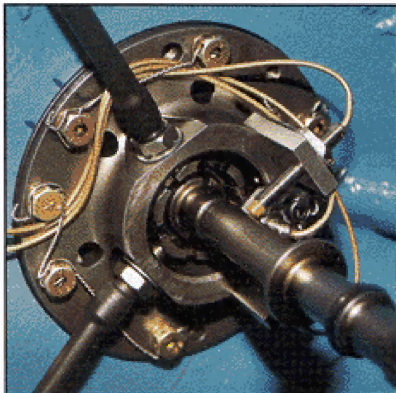
Many of you have had similar problems at your facilities. It showed our people that an owner/operator position is a lot different from that of a third party. The gas turbine-generators are providing a very direct learning experience which allows our people to understand the operation of turbomachinery and to bet-

ter understand your problems.

According to Roger Harker, President and Chief Operating Officer of Bently Nevada Corporation, "We've brought the field to headquarters and put ourselves in the driver's seat as operators. We have a unique opportunity to see how our customers view our products."

The Garrett-Onan skid-mounted generator sets, rated at 560 kW each, had provided power and waste heat for a quarry operation and then sat idle for nearly fifteen years. The Garrett IE831 800 dual fuel turbines run at 41,000 rpm and drive an Onan generator through a gearbox at 1,800 rpm. At Bently Nevada,

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Closeup of the proximity transducer installation on the gas turbine.

the turbine operates on diesel fuel. A 10,000 gallon fuel tank allows us to run our operation for up to two weeks in the event of an emergency.

Turbine installation

Roger Harker assumed the role of Plant/Operations Manager during the installation. Our Facilities department became both Maintenance and Operations departments for the project. MDS became the Machinery Engineering Group. Technical Training trained Facilities personnel on the operation of the Bently Nevada instrumentation and monitoring systems.

Many other departments at Bently Nevada also provided service to the project. Everyone involved gained invaluable experience and insight into what our own customers go through operating their turbine-generator sets.

Instrumentation

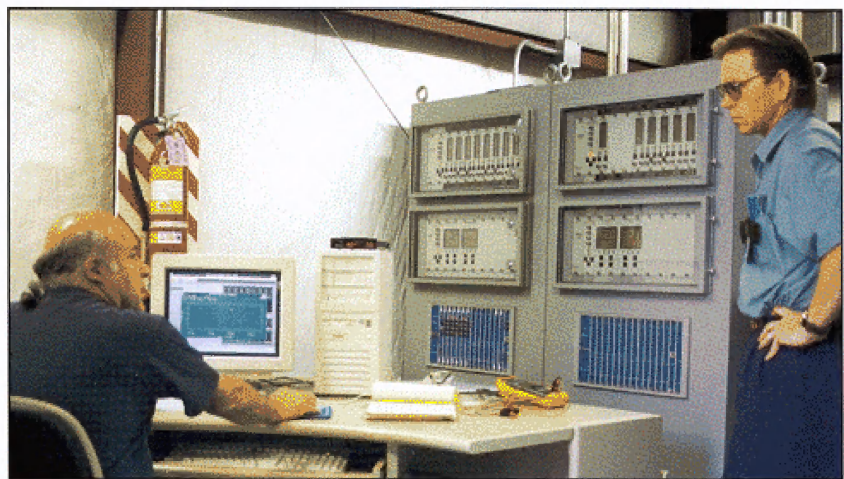
Bently Nevada 3300 Monitoring System and 3500 Machine Management Systems are currently installed on the

turbine-generators. A Data Manager® 2000 for Windows NT System is linked to the 3500 System to provide data display, trending and online diagnostics. Our Machinery Diagnostic Services (MDS) group supervised machinery instrumentation. This included the following: the initial audit to determine the appropriate transducers and installation locations, fabricating the mountings, installing the transducers, performing remote diagnostics, providing advisories and actionable information and taking corrective action. The corrective actions included alignment, balancing and structural modifications to change a structural resonance frequency at the rotative speed of the generator.

Having a Plant Manager whose priorities included a high concern for effective protection and machinery manage-

ment was a major benefit. MDS instrumented the turbine as it never had been before, including proximity probes at the hot end of the machine and a Bently Nevada TorXimitor® for instantaneous power measurements and torsional measurements.

Engineers from the Bently Rotor Dynamics Research Corporation served as consultants to model the machine and conduct Dynamic Stiffness tests. Our Product Service group supervised the installation and configuration of the instrumentation that would provide machinery protection, as well as local and remote diagnostic capability. This included the 3300 Monitoring System, the 3500 Machinery Management System and the Data Manager® 2000 online computerized machinery management system. ■



Personnel from many departments at Bently Nevada were involved in the turbine installation. Everyone gained invaluable experience and insight into what you go through operating your turbine-generator sets. Instrumentation includes a 3300 Monitoring System and 3500 Machinery Management System. A Data Manager® 2000 for Windows NT System is linked to the 3500 System to provide data display, trending and online diagnostics.